work in the interests of his muse, instead of merely for his own selfish ends, the public would not be slow to appreciate scientific work more nearly in accordance with its merits.

T. D. A. COCKERELL.

Il Codice Atlantico di Leonardo da Vinci nella biblioteca ambrosiana di Milano. Reprodotto e pubblicato dalla Regia Accademia dei Lincei sotto gli auspice e col sussido del Re e del Governo. Milano. ULRICO HOEPLI, Editore Librajo della Real Casa e della R. Accademia dei Lincei. New York, G. E. Stechert. 1894–8. 35 parts; 800 pages; 1750 drawings and illustrations; folio. $240.

This magnificent reproduction of the extraordinary works of one of the most wonderful men of genius known to history is a work for which the world has long waited. It is issued in parts to subscribers, and none are furnished to the trade or furnished as complimentary copies. Each of its thirty-five parts contains 40 heliotype plates, reproducing the drawings and sketches of the great author, with double transcription of the text, and with notes. It is printed upon hand-made paper, 38 cm. (15 in.) by 50 cm. (20 in.) in dimensions; and but 280 copies, it is stated, will be issued. The first 20 copies are supplied to the earliest subscribers, in order of date, at a discount of 20 per cent. Inspection is permitted of the first part before subscribing.

The work has been performed under the direction of the Italian Ministry of Public Instruction, and with direct supervision of the Royal Academy, and the transcription was made by Dr. John Piumati—already distinguished both for his learning and for his success in earlier and somewhat similar work—assisted by Lucas Beltrami, well known in connection with his work on the Vincian Codex of the Trivulzian Library. The work is intended to give as complete a reproduction as the existing remains permit of the collection of manuscripts of Leonardo, now almost four centuries old, which, since the death of Menzi, a half-century after their completion, have been dispersed.

Pompeo Leoni gathered a large proportion of them together, somewhat later (1587), and produced the 'Codex Atlanticus' of that time. Cardinal Frederic Borromeo ordered its transcription in 1626, and his Ambrosian Library became its possessor in 1637, meantime an offer of a thousand doubloons from Charles I. of England having been refused. During the last century Anthony David made a study of its collections in mechanics, and Balthasar Oltroccio, Governor of Ambrosian Library, made it the basis of a Life of Leonardo, later published by Amoretti. The Codex itself was captured by the French in 1796, and taken to Paris for the National Library, where Venturi found it and made it the source of his writings upon physics and mathematics, largely.

Libri, Omodeo, Angellucci and others studied it in its old home, but the publication of the whole collection has only now been undertaken. The commencement of the enterprise here illustrated was actually made with the issue of the 'Saggio' at the time of the inauguration of the monument to Leonardo, at Milan, in 1872; its twenty-four plates giving a foretaste of what was coming, so interesting and absorbing to collectors and admirers of the great soldier, poet, engineer, artist, and man of science, as to compel immediate assurance of the ultimate completion of the work.

This splendid reproduction will throw new light upon the character and achievements of the man who has been mainly portrayed by his biographers as a sort of Admirable Crichton with a genius primarily artistic, and who have obtained their ideas from such biographies, rather than from a source giving a true account of his life and his work in all its various fields. Even a cyclopedia like Johnson's, generally regarded as having a scientific rather than a literary or artistic character, gives prominence to his accomplishments as artist, says little of his achievements as soldier, his talents as engineer, or his learning in science and in literature. His 'Last Supper' is given deserved attention; a catalogue of his paintings is presented, and a good bibliographical list is submitted; but its author says: "It is impossible, in the space at command, to give an account of Leonardo's scientific labors;" and none is given, and but little is suggested, to indicate to the reader the fact that he was a great military engineer, a

talented inventor, a skilled mechanic, and perhaps the most learned scientific man of his age and nation.

The fact is that it was Leonardo who re-imported, more than any other scientific man of his time, the sciences of the Saracens, after their migration from ancient Greece with the disciples of Aristotle and the Ptolemies, and their long residence in Egypt, their incorporation with the older learning of the Orient and of the Arabs, and their purification and systematization by union with the mathematical, and especially the astronomical, sciences of those builders of its most solid foundations. It was Leonardo who made applied science systematic, who studied botany as a biologist, interpreted geology, laid the scientific foundation of professional engineering construction, and who, in his studies of the true theories of mechanics, and of their utilization in the arts of war and of peace, made of himself that type of the modern man of science now most characteristic of our own time, the man of science employing a combination of pure and applied science in the promotion of all the arts of the civilization of his time. These facts are not always even suspected by the reader of existing biographies, but a study of this unique collection of heliotyped plates, *fac similes* of his drawings, will bring the true character and the real life and habits of the man into view, and will throw into high relief the most important characteristics of his genius.

This graphical autobiography is the story of the life and work and inmost thought of the man, without intermediary. It shows him constantly engaged in devising new machinery, usually of war, with new plans for the application of scientific learning, of reduction to practice in the art of war, principally, of the then novel discoveries of science; utilizing the returning current of physical, chemical and mechanical sciences; then recrossing the Mediterranean, never to be again lost to Europe or the world.

These singularly interesting drawings are reproduced with all the fidelity coming of the use of heliographic processes; and one of the interesting and curious evidences of the fact that they are made perfect *fac similes*, without reference to their character, is seen in the inscriptions, autographic incriptions by Leonardo, which must be read by the use of a mirror. The Italian is perfectly good and intelligible; but, until it is noted that the plates are thus reversed, it is somewhat of a puzzle to the student of Leonardo's sketches. The whole constitutes, that form of condensation of the invention and the arts for his time, which is similarly illustrated by Hero, the Greek author, many centuries earlier, in his 'Pneumatica,' and by Branca, by Leupold and by others since, in other places and in more modern times. The work will have value from many points of view and will find its place in every library of importance. It should, and undoubtedly will, become familiar soon to all collectors, to all men of science, and to the professional posterity of Leonardo among members of the engineering professions. Its publication cannot fail to add enormously to the fame of an already famous man who has rightfully been regarded, even in the absence of this testimony, as perhaps the most eminent example of the 'universal genius,' in science, literature and art, and the arts as well, yet given a place in history.

Leonardo, the biologist, anatomist, botanist, hydraulician, geometrician, algebraist, mechanician, optician, the inventor of the marble-sawing machine, a rope-making apparatus, of innumerable varieties of ballistic machines and ordnance, the seer of coming steam-engines and of steam-navigation and transportation, of steam-guns and breech-loading arms with the 'modern' screw-breech-block, of canals and other engineering works, the maker of uncounted plans, designs and inventions; in fact, this Leonardo is revealed, not in biographies, but in his manuscript, of which even this great Codex constitutes only a fraction. Such widely distributed interests and such variety of talent could not be exhibited to-day, even by a man like Leonardo, of rare genius, unequaled talent, indefatiguable industry and unlimited ambition; and even in the sixteenth century this universality of genius was without rival among men of science, and Leonardo's was the noblest mind of his time.

R. H. Thurston.